

U.S. coastline vulnerability to hurricanes is growing to unprecedented levels

By John Scala August 26, 2015

Nearly ten years have passed since a category 3 or stronger hurricane invaded the U.S. coastline; an unequaled length of time in the record of U.S. hurricane landfalls. This “hurricane drought” is not just a concern for the state of Florida, but also for the miles of coastline stretching from Texas to Maine.

Changing demographics, relentless coastal development, and an unintended but growing storm complacency is elevating the vulnerability of those in the path of the next major hurricane landfall to unprecedented levels.

Much attention has been given to Florida’s hurricane exposure, and rightly so, but residents of the Sunshine State are not alone in this threat. A country’s fixation with the coast must come to grips with how the local shoreline configuration combined with historical hurricane landfall records and societal trends are raising the bar on community vulnerability. The experience of a decade ago should remain a fixture in any discussion of hurricane preparedness, but is it?

The 2005 Atlantic hurricane season took the lives of nearly 4,000 people and delivered unprecedented economic hardship to the Gulf Coast. The financial consequences of this historic season eventually spread across the entire U.S. affecting insurance policy and underwriting as well as the transport of goods and services. A record 28 storms, including 15 hurricanes and 7 major hurricanes (also records) contributed to a \$160 billion price tag, a damage estimate equivalent to the GDP of the 56th richest country in the world.

This season to remember was marked not only by Category 5 Hurricanes Katrina and Rita, but also by Wilma, the last major (Category 3 or stronger) hurricane to strike the U.S. Wilma holds a firm grip on the record for the lowest sea level pressure (882 millibars, estimated from a reconnaissance aircraft dropsonde) for an Atlantic basin hurricane. And here is another attribute of the 2005 Atlantic Hurricane Season which may surprise: [a record five names were retired](#) from the National Hurricane Center's tropical cyclone lexicon: Dennis, Katrina, Rita, Stan and Wilma.

Florida inherited the dubious distinction of being a hurricane magnet in mid-2000s when seven hurricanes struck the state in just 14 months, from August 2004 through October 2005. The centers of three of them, Charley, Frances, and Jeanne, crossed the central Florida county of Polk, prompting Brian Bossak of the USGS's Center for Coastal and Watershed Studies to describe this crazy county convergence as the 2004 Hurricane Bull's-Eye.

Since 2005, no category three or stronger hurricane has made landfall in Florida or crossed any portion of the U.S. coastline. This ascribed "landfall drought" is raising preparedness concerns within the emergency management community. Officials of the Sunshine State warned the paucity of activity over the last decade could lead to complacency, particularly within the inexperienced (when it comes to evacuation) Florida population.

The Category 3 or stronger hiatus is even more astonishing when one views the geographic configuration of Florida relative to the entire U.S. coastline: the peninsula extends south into warm, tropical waters and directly into the path of Atlantic basin hurricanes tracking west from the Caribbean into the Gulf of Mexico. Florida stands equally stalwart in the face of Atlantic hurricanes experiencing that recurve when their high altitude circulations respond to the prevailing westerlies. Only the central Louisiana and North Carolina coastlines offer similar interference to the path of Atlantic basin storms.

Historical records suggest a hurricane would be expected within

50 nautical miles of the Louisiana coast south of New Orleans, the southeast Florida coast in the vicinity of Miami and along the North Carolina coast on average once every 5 to 7 years. The return period increases to 14 to 20 years when we consider Category 3 or stronger hurricanes, a statistic which stands in sharp contrast to the rest of the U.S. coastline.

So, why the concern over a 10-year absence in major hurricane landfalls when the expected return period for the most vulnerable portion of the U.S. coastline is four to 10 years beyond the observed hiatus? The cited recurrence interval is parish or county specific and not reflective of the annual national exposure to hurricane landfalls. The stark reality is coastal communities are living on borrowed time, and to adapt a quote from a well-known Hollywood movie, are seemingly writing checks their collective municipalities cannot cash.

How rare is the current 10-year “drought”? The results of a 2015 statistical study by Timothy Hall of the NASA Goddard Institute for Space Studies indicated a nine-year hiatus in major hurricane landfall along the U.S. coastline would be expected to occur once every 177 years.

The study also pointed out the probability of ending the “drought” in the succeeding year is 39 percent, regardless of the length of the hiatus. Attribution for the paucity of activity aside, changes in population demographics, personal wealth and critical infrastructure paint a disturbing scenario for the next major hurricane landfall. According to the 2010 census, 39 percent of the U.S. population is concentrated in counties and parishes with direct coastline access.

Coastal population growth is expected to increase by almost 9 percent by the start of the next decade stressing the local transportation routes and delaying evacuation times away from threatened coastal communities. A recent article by the National Ocean Service (NOS) addressing population trends along the U.S. coast states, “...coastal counties contain 53 percent of the

nation's population, yet, excluding Alaska, account for only 17 percent of U.S. land area.”

Total damages and insured losses are expected to increase concurrent with the increased square footage of new coastal homes. From the same NOS article, “...more than 1,540 single-family housing units are permitted for

construction every day in coastal counties.” And the Hall study reminds us the hurricane hiatus could end abruptly. How can we as a society increase awareness and preparedness while mitigating the risk of living and working near the coast in even greater numbers?

Hurricane Charley was the strongest Atlantic basin hurricane to strike the U.S. since Andrew made landfall in Homestead in 1992, 12 years earlier. Although a hurricane warning was in place for Port Charlotte and Punta Gorda on Florida's Gulf Coast, rapid strengthening shortly before landfall resulted in widespread destruction and 10 fatalities. 2010 Census numbers reveal the median age of Port Charlotte at the time was 52.3 years, more than 10 years above the state average. The community also experienced a 17.1 percent rate of growth over the previous decade.

More densely populated coastal communities lying at no more than ten feet above sea level and served by a limited number of evacuation routes compromise preparedness efforts and threaten public safety. The influx of retirees over the past 10 years seeking to live out their final years in the absence of winter snow and cold arrive in Florida and other southern coastal communities with little or no experience in hurricane evacuation.

The precarious combination of an aging, growing population, taxed infrastructure and what amounts to an ignorance of threat posed by hurricanes extends beyond Florida (where most of the emphasis lies) to include the entire coastline stretching from Texas to Maine. The major hurricane landfall drought is not only statistically rare; it is a bellwether for rising coastal vulnerability

while lulling a growing population into a false sense of security.

The author, John Scala, is a broadcaster and certified consulting meteorologist based in Lancaster, PA. His career includes a post-doctoral appointment at NASA's Goddard Space Flight Center, two academic positions and the first on-air Storm Analyst at The Weather Channel.
